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FOREST FIRE CONTROL

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FIRE FIGHTERS TRENCHING FIRE LINE

GOVERNMENT PRINTING OFFICE

MANY PEOPLE who desire to assist in preventing fire damage are in doubt just what to do. These suggestions are offered because the Forest Service recognizes that the whole-hearted cooperation of every person in and near the national forests is essential in successfully reducing fire damage and in keeping the forest green and beautiful.

An effort has been made to state simply and briefly some of the basic principles of fire prevention and fire suppression, and it is hoped that the suggestions may be of value to travelers and campers as well as residents in and near the national forests, who form one of the strongest protective links in the whole system.

Extraordinary results are apparent where citizens, both from within and outside the State, have taken immediate initial action on fires, and the district forester is glad to take this opportunity to express his sincere appreciation of what has been done.

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FOREST FIRE CONTROL

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A FEW FOREST FACTS

The national forests are public property and every citizen is part owner.

Prompt action on small fires will preclude the necessity for large expenditures of public funds.

Thirty-five per cent of the gross receipts from the sale of resources on the national forests is expended for school and road purposes in the national forest regions. These receipts will be decreased if large fires occur.

Lightning is responsible for an average of 17 per cent of the fires in the Rocky Mountain District annually. The other 83 per cent are man caused and are preventable.

All fires are small at first, and if they are promptly put out expense and damage are avoided.

Every unextinguished fire is a source of danger.

Even the most harmless looking fire may develop into a holocaust. On October 12, 1918, 500 people lost their lives in Minnesota between noon and midnight, primarily because small fires were not given proper attention in time. Property loss which occurred at that time is variously estimated up to \$100,000,000.

Many so-called "brush fires" are frequently said to have caused no damage. This is a mistake; nature has provided brush and broad-leaved trees on old burns

which act as a nurse crop. Under this cover, shaded from the sun's glare, baby evergreens start, and the casual observer does not realize their existence until they are several feet high. When fire burns the brush, these little fellows are destroyed and it may be that there are no old evergreens left to reseed the area. When this is true, the only way to get evergreens back is to plant seedlings, and that is expensive.

SOME NECESSARY PRECAUTIONS

SMOKERS

Smokers and campers are the cause of most of the man-caused fires which now occur.

Smokers indifferently or carelessly discard burning matches, cigars, cigarettes, and tobacco from moving vehicles. In many cases these die out without doing harm, but great expense and damage are involved frequently because these "fire starters" are not entirely extinguished before they are dropped. Always *be sure* that no fire or glow remains.

Better still, equip vehicles with containers for ashes, stubs, and used matches. These may be obtained from dealers at small expense, and attaching them to the dashboard or back of the seat is simple.

Never discard burning articles from trains. Property injury often results if you do.

Smokers who are afoot or on horseback must use the utmost care if damaging fires are to be eliminated.

Voluntary restraint from smoking is urged during dry seasons or on areas where the fire hazard is high. Places where timber has been cut or where the grass is ripe and dry are examples of high fire-hazard areas.

CAMPERS AND PICNICKERS

Most outdoor travelers have a sense of "good woodmanship" and select a safe place to build a fire.

A few are unused to being in the open and lack knowledge of the danger from fire in the absence of certain precautions.

Every individual or party who builds open fires, whether traveling by auto or otherwise, should be equipped with a shovel, ax, and water bucket.

Kerosene or gasoline camp stoves are safer than open fires.

Never build a fire against a log or stump, because when these get burning it is difficult to put them out, and in all probability there will be fire left under the log or in the roots after you think you have killed it. Hours or days later an increased wind fans these embers into flame and a forest fire results.

Never build a fire near brush or dry grass. The wind may cause you to lose control of it in a few seconds.

Never build a fire against a tree. Even if the fire does not scorch the foliage it will dry out the bark and injure the root growth, and repetition of the fire kills the tree.

Many a camp site has been just as effectively ruined by unseen fire as by ax and jackknife in the hands of a thoughtless or indifferent visitor.

Select the right kind of a place. Scrape away all inflammable material from a spot 5 feet in diameter. Dig a hole in the center in which to build the fire. Keep it small.

Do not leave it unattended even for a few minutes. A sudden wind may cause it to do the unexpected thing.

Do not leave camp until you are perfectly sure that your camp fire is out.

BRUSH BURNING

Damage from brush-burning fires has been greatly reduced in the past few years. It usually results from clearing land. Such burning is often necessary in order that farm lands may be put under cultivation, but damage to surrounding territory can be avoided if a few precautions are taken.

Make medium-sized piles; large piles cause so much heat and the flames go so high that one can not get close if it should be necessary to quiet the fire. With a plow or with shovels and mattocks make a fire line around the edge of land on which piles are to be burned. You will thus have a place to stop a fire running over the ground if it does start.

If you have more than two or three piles to burn, have hired help or some of your neighbors on hand to render assistance as a matter of precaution.

Burning should not be attempted if there has been a long dry spell. Just after a good rain or light snow is safest.

Each man should have a shovel or an ax, and a few pails of water should be handy.

Wait until after the heat of the day, usually until after 3 p. m., before touching off the piles.

Do not start to burn if the wind is blowing.

Do not touch off more than two or three piles at a time; let these burn down pretty well before getting others going.

If excessive heat is generated from a burning pile, it may be reduced by shoveling sand or dirt on it or by throwing on a few pails of water.

After the burning piles are reduced to embers, have some one stay on guard until all fires are entirely dead.

The wind comes up unexpectedly at times and is often the cause of fires escaping from control.

In some States the law requires that you secure a permit before burning may be done. Even if you are not required to have a permit it is desirable to talk to a forest officer or fire warden about the burning you want to do. They have knowledge of conditions over a wide territory and can often render valuable advice or aid.

Notice of intended burning will be appreciated by forest officers and fire wardens, since they must immediately investigate every unknown smoke. If they do not know in advance that you are going to burn, there is sometimes an unnecessary loss of time and expense involved in getting to a fire where they are not needed.

LUMBERING

Lumbering constitutes a dangerous hazard unless precautionary measures are taken.

Spark arresters on boiler stacks and railroad logging engines must be properly installed and inspected at short intervals.

Where coal or wood burning locomotives are used, rights of way should be kept clear of inflammable material. Speeder patrol should be effective behind all trains during the fire season.

Locomotives should be equipped with a pump and a reel of hose to aid in suppression work along the rights of way if needed.

Oil as a fuel is good fire insurance and its use in locomotives is recommended.

Brush and débris around sawmills and woods camps, and along main roads, should be cleared up and burned before the fire season opens.

Smoking by employees should be restricted to camps or places where there is no inflammable material.

Fire-fighting equipment should be kept ready for instant use and at no time used for any other purpose.

Chemical extinguishers should be kept in buildings for emergency use, and where a water system is installed fire hose on reels should be available.

In regions where water is readily available, portable power pumps with about 1,000 feet of light hose should be kept in shape for emergency call.

On large operations a "fire chief" should be employed, his particular business being to look after all matters relating to fire control.

On extensive holdings, foot or horse patrolmen should be assigned whose business it is to look after fire prevention in general and take immediate action on fires if they occur.

SUMMER HOME AND RESORT OWNERS

The premises should be kept clear of all inflammable litter.

Limbs of trees and slash resulting from construction work of any kind should be piled and burned.

Shovels, axes, mattocks, and water buckets should be kept for fire use.

Chemical extinguishers should be kept in working order at all times.

Where a number of individuals are grouped on a certain area, it will be found a good investment to hire a fire guard. The expense per capita will not be heavy. Not only will he exercise immediate supervision over fire control for the buildings, but he will look out for fires caused by hikers, campers, and others which might cause the destruction of the colony.

Very often women and children are alone at the summer homes, the men returning to business except for week ends. A good experienced man continuously on duty during the fire season may prove to be an enormous asset in emergency.

LAW ENFORCEMENT

State laws provide for certain precautions and care with fire, even on private lands, and penalties are provided for failure to observe these.

Federal laws are also enacted which provide penalties, including fine and imprisonment, for offenders who cause fires on Government land; and action is taken to collect all cost and damages from persons responsible for fires.

Cooperation is desired in securing evidence on fires which are left carelessly or which are allowed to escape bounds.

Forest officers have a large territory to cover, and, though they find a large number of offenders, better progress will be made if everyone will carefully observe how fire is handled by others and report violations of the law to forest officers.

If you are able to learn the name and address of the person responsible, that is the best kind of evidence.



FIG. 1.—*Forest fire on South Boulder Creek. Continental Divide in background*

In any event note a description of the outfit: How many men, women, and children are in the party; how they are traveling; if by automobile, secure the license number; note the time of day when fire was left or started.

WHAT TO DO

Take immediate action on any unattended fire you find. If it has covered only a few square feet and is smoldering, put it out with water. If water is not at hand, use sand or clean dirt.

Pour water on the fire, and then with a shovel or stick stir the embers, dirt, and water together until it is well puddled;

then pour on some morewater. Drowning a fire with water is the surest way to kill it.

If it is spreading in grass and leaves, it may be quieted by beating it with gunny sacks or a wetted heavy coat.

If the fire is on sandy soil, such as occurs in Michigan or Nebraska, take a shovel and "sand" it; that is, take a shovelful of sand and throw it along the fire parallel to the burning edge. One can kill down a lot of fire very rapidly in this manner.

In the mountain region sand is not often available and shovels and axes must be used and fires stopped by cutting a trench around the outside. (See title-page illustration.) Use the axes to cut logs in two and to cut down trees which are in the way where the trench is'to be made. Then take a shovel, or, if there is heavy sod and you have a mattock, use that to clear away all the needles, duff, and grass and make a trench about 12 or 14 inches wide in the clearing that has been cut.

This is what fire fighters call the "fire-control line." It is necessary to make the trench only deep enough to get to mineral soil. The object is to remove the inflammable material ahead of the fire so that when it burns up to the trench it has nothing more to feed on and dies out.

If the fire is traveling slowly, try to put the first line in front of it and later trench the sides and rear.

If it is running rapidly, it is advisable to go some distance ahead to an old trail or road or open ridge to put in a line.

If it is a runaway, going up a steep side-hill or fanned by a high wind, start what

is known as a "flank" attack; that is, begin building the trench on the sides from the rear and keep following around the fire until it is surrounded.

Throw the needles and litter and cuttings from the trench away from the fire. If you throw them toward the fire, that much more fuel is added to increase the heat when it burns up to the line.

As the fire comes up against the line it will try to jump in spots, and right here all the joy of battle may be experienced.



FIG. 2.—*The result of carelessness*

It will be hot and smoky, but the satisfaction of holding every foot of trench will repay the effort.

If the fire wins at any point, it is necessary to repeat the same tactics until it has been subdued,

When the control line has been completed and the fire checked, do not think the job is over. The fire is only looking for a chance to escape and start the rampage all over again. Now is the time to strengthen any weak-looking spots in the line—kill down all fire near the line, in stumps, roots, and logs. Do this with water if it is easily available; if not, cover the burning spots with clean dirt.

Cut down all snags and dead trees that are afire and fell them into the fire. Otherwise when the wind comes up each snag will develop into a torch from which new fires will start outside the lines. (Fig. 2.)

See that the lines are constantly patrolled. The fire will sneak across the line in an old root and start anew, or the wind may pick up a spark and start a new fire unless there is constant vigilance.

When the fire has been put out near the edges, keep working around it toward the center, killing down every smoke and ember.

Before deciding all danger is past at the control line, feel the ground wherever there is the least possibility that fire may be left underground.

Very frequently there is fire in some old root that is not smoking and gives no evidence to the eye, but if left may later be fanned by the wind and cause a new fire to start.

WHEN TO START ACTION

Immediate action is imperative. Fires attacked quickly can nearly always be put under control in a few minutes.

Quick action should be taken on the larger fires as well, and no matter what

time of day they occur an attempt should be made to stop them.

If the job is not completed the first day, plan to start work on succeeding days at daylight. At this time fires are quieter than at any other period, there is moisture in the air and much more effective work can be done then than during the heat of the day.

If there is more than one man on the fire and it is necessary to have more help, send only one as a messenger. Others can do effective work by staying on the job.

TRAVELERS

With your equipage you should have an ax, a shovel, and a canvas water bucket. These are essential for camping and will prove a big asset in working on fires.

If the tools you have are insufficient, open up a Forest Service fire cache where tools are maintained for fire use only.

Whether you are successful or not in putting the fire out, please report the case to a forest officer if he can be reached easily. If not, report the incident to a local settler or official, and it will be appreciated if you will also leave your name and address. The Forest Service likes to know its friends and needs the data on all fires for its records.

COOPERATORS

Practically every settler, stockman, prospector, and millman takes an interest in fire-control work in the national forests. Town and county officials are assisting, and altogether conditions are immeasurably better than they were 20 years ago.

Each ranger establishes direct contact with the people in his district, and as a result his fire plan indicates those on whom

he can rely for immediate initial action in case of fire in their various localities.

KEY MEN

It is fundamentally true that on any job where several men are employed there is a need for some one to direct the work and assume responsibility for results.

Recognizing that as yet some fires will assume considerable proportions and that it is a physical impossibility for the rangers always to be in the vicinity when fire breaks out, arrangements have been made with certain individuals in various localities to act at once in their stead.

These are known as "key men," and they have authority to assemble crews, arrange for transportation, secure supplies, and take initial action on fires.

The key men are informed by the rangers as to the location of field tool caches and routes of communication and transportation; and reliance is placed on them as upon forest officers to meet fire emergencies.

Many campers and motorists use gasoline or kerosene camp stoves, but the cost of equipment may be reduced by using a homemade affair. Figure 3 shows how a satisfactory heating arrangement may be made from a 1-gallon fruit can. A third to one-half of the can is filled with gravel which is saturated with gasoline taken from the motor, and which, when lighted, will burn a sufficient length of time to provide heat for cooking a meal. The three holes near the top of the can provide for draft. This ingenious idea was picked up from a traveling motorist last summer on the Pike National Forest.



FIG. 3.—A homemade camp stove

